

### **Abstract**

A vial closure device, a sample vial incorporating such a vial closure device, and certain methods of using such a vial and closure device. The vial and closure device are intended to contain a gaseous sample or a headspace gas present above a liquid or solid material, so that the gaseous sample or headspace gas can be conveniently analysed, typically by means of an autosampler connected to an analytical instrument such as a mass spectrometer. Mass spectrometric methods of determining the isotopic concentration of hydrogen and oxygen comprised in aqueous samples contained in vials fitted with such closure devices are disclosed. The vial closure device comprises a hollow body member locatable in the mouth of a vial, and a first seal for making a substantially gas-tight seal between the exterior of said hollow body member and said vial. The hollow body member comprises an aperture and an aperture closing means for closing said aperture when required, and a second seal, through which a gas sampling means may be inserted. The aperture closing means is operable to open the aperture by the insertion of a gas sampling means through the second seal and is operable to close the aperture when the gas sampling means is withdrawn.